



Agricultural Aircraft Aid

Farmers are increasingly turning to aerial application of pesticides, fertilizers and other materials, due to growing costs of doing these jobs by ground methods. Sometimes, however, the advantages of aerial crop spraying are negated by uneven distribution of the chemicals, caused by such factors as improper alignment of spray nozzles, worn nozzles or system leaks. When that happens, the job must be redone, with added expense for both pilot and customer. In most cases, the applicator could readily correct the problem if he could accurately measure the deposition of the chemicals to find out why the dispersal pattern was not uniform. But traditional pattern analysis techniques may take days or even weeks; to operate effectively, pilots need a quicker way of getting the information.

Dr. Lawrence O. Roth, Professor of Agricultural Engineering at Oklahoma State University (OSU), has developed a system for providing answers within minutes. He was assisted in his work by a NASA funding grant, by wind tunnel and computer validation of his research and by the technical expertise of Langley Research Center and Wallops Flight Center, which are extensively engaged in technology development for agricultural aircraft.

Called the Rapid Distribution Pattern Evaluation System, the OSU system consists of a 100-foot measurement frame tied in to computerized analysis and readout equipment. The frame is placed perpendicular to the flight path of a spray plane (top) to collect samples of either liquid or granular materials. To test liquid deposition patterns, the sprayplane's tanks are loaded with a fluorescent dye. As the plane passes overhead, droplets of the dye fall onto a paper tape running the length of the frame; at left, a researcher is examining a tape. The tape is then fed into a scanning instrument called a "fluorometer" which analyzes the quantities of droplets along the length of the tape. A computer

readout (below) provides a chart of the "peaks and valleys" in the distribution pattern.

For granular material, the procedure is somewhat different. Across the frame are a series of one meter square bins which collect particles during a test pass. The particles are weighed to determine the amount of material that fell in each area; the data is entered into the computer, which produces a pattern chart.

The OSU system is mobile, delivered by trailer to airfields in agricultural areas where OSU conducts educational "fly-ins." A fly-in typically draws 50-150 aerial applicators, researchers, chemical suppliers and regulatory officials. An applicator can have his spray pattern checked—usually by flying three passes over the measuring system. A computerized readout, available in five to 12 minutes, provides information for correcting shortcomings in the distribution pattern, for example, nozzle repairs, additional nozzles or just rearrangement



of nozzles. In the latter case, the applicator can make on-the-spot adjustments (right) and recheck his pattern. Other users of the OSU system include agricultural aircraft manufacturers seeking to develop or improve dispersal systems for their aircraft.

This year, a commercial version of the OSU system will form the backbone of Operation SAFE, an industry-sponsored program, being implemented by the National Agricultural Aviation Association, to improve the safety and efficiency of applying agricultural chemicals by aircraft.

